WHAT IS CLAIMED IS:

1. A simulator having computer-aided design programs for verifying an algorithm of a shift controller of an automatic transmission mounted on a vehicle having a change-speed system and associated hydraulic actuators to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the algorithm, comprising:

a computer which stores the computer-aided design programs in memory and connected to the shift controller for inputting the algorithm;

pseudo signal generating means connected to the computer for generating pseudo signals indicative of at least the throttle opening, the vehicle speed and operation signals for the hydraulic actuators and for sending the pseudo signals to the computer;

wherein the computer-aided design programs include:

first calculating means for calculating outputs of a first model describing behavior of the engine, a second model describing behavior of the transmission and a third model describing behavior of a body of the vehicle at a first calculation cycle based on the algorithm and the pseudo signals;

second calculating means for inputting at least the calculated outputs of the first model and the second model and for calculating an output of a fourth model describing non-linear behavior in the second model at a second calculation cycle which is shorter than the first calculation cycle; and

algorithm verifying means for verifying the algorithm based on the outputs of the first model, the second model and the third model.

2. A simulator according to claim 1, wherein the fourth model describes the behavior of supply of hydraulic oil to clutches of gears to be shifted to and from at a shift.

3. A simulator according to claim 1, wherein the second calculation cycle is determined based on a step response relative to an input to the fourth model.

4. A simulator according to claim 2, wherein the second calculation cycle is determined based on a step response relative to an input to the fourth model.

5. A simulator according to claim 3, wherein the fourth model is configured to output the input through a λ-function and the second calculation cycle is determined to be a value which is proportional to a reciprocal of the λ-function.

6. A simulator according to claim 4, wherein the fourth model is configured to output the input through a λ-function and the second calculation cycle is determined to be a value which is proportional to a reciprocal of the λ-function.

7. A simulator according to claim 1, wherein the second calculating means is started in synchronism with the first calculating means, but no recursive processing is made until the calculation of the first calculating means have been completed.

8. A simulator according to claim 7, wherein the second calculating means outputs the calculation result processed based on parameters inputted at the previous time and then conducts new calculations based on the parameters inputted at the current time.